

AD _____

COOPERATIVE AGREEMENT NUMBER DAMD17-95-2-5032

TITLE: Procedures and Data of Current Antidotal Therapies for
Toxicants Employed as Chemical Warfare Agents

PRINCIPAL INVESTIGATOR: David W. Hobson, Ph.D.

CONTRACTING ORGANIZATION: American College of Toxicology
Bethesda, Maryland 20814

REPORT DATE: February 1997

TYPE OF REPORT: Final

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for public release;
distribution unlimited

The views, opinions and/or findings contained in this report are
those of the author(s) and should not be construed as an official
Department of the Army position, policy or decision unless so
designated by other documentation.

19970327 053

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)			2. REPORT DATE February 1997	3. REPORT TYPE AND DATES COVERED Final (28 Sep 95 - 27 Jan 97)
4. TITLE AND SUBTITLE Procedures and Data of Current Antidotal Therapies for Toxicants Employed as Chemical Warfare Agents			5. FUNDING NUMBERS DAMD17-95-2-5032	
6. AUTHOR(S) David W. Hobson, Ph.D.				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) American College of Toxicology Bethesda, Maryland 20814			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research and Materiel Command Fort Detrick, Maryland 21702-5012			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200) The procedures and data from medical chemical defense research projects investigating current antidotal therapies for chemical warfare toxicants sponsored by the U.S. Army are of interest and benefit to other scientists engaged in similar or related research. The purpose of this project was to compile state-of-the-art information in the form of peer-reviewed scientific manuscripts for publication in a special "Chemical Defense Toxicology" issue of the Journal of the American College of Toxicology (Volume 15, Supplement 2, 1996). A total of 25 manuscripts were received and reviewed. Eleven manuscripts were selected for inclusion in the special issue with several other manuscripts deemed suitable, following revision, for publication in regular editions of the journal. This project demonstrated a relatively rapid and effective mechanism by which such procedures and data can be peer reviewed by qualified and experienced scientists and then presented to other interested researchers. The time from receipt of the first manuscript to special issue publication was nine months. Conclusions are presented which will provide a model for other future special issues to follow and identify possible means for improving the process to further reduce the time to publication.				
14. SUBJECT TERMS chemical warfare agents, antidotes, mechanisms, publication, peer review			15. NUMBER OF PAGES 23	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited	

FOREWORD

Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the U.S. Army.

____ Where copyrighted material is quoted, permission has been obtained to use such material.

Where material from documents designated for limited distribution is quoted, permission has been obtained to use the material.

X Citations of commercial organizations and trade names in this report do not constitute an official Department of Army endorsement or approval of the products or services of these organizations.

In conducting research using animals, the investigator(s) adhered to the "Guide for the Care and Use of Laboratory Animals," prepared by the Committee on Care and use of Laboratory Animals of the Institute of Laboratory Resources, national Research Council (NIH Publication No. 86-23, Revised 1985).

For the protection of human subjects, the investigator(s) adhered to policies of applicable Federal Law 45 CFR 46.

In conducting research utilizing recombinant DNA technology, the investigator(s) adhered to current guidelines promulgated by the National Institutes of Health.

In the conduct of research utilizing recombinant DNA, the investigator(s) adhered to the NIH Guidelines for Research Involving Recombinant DNA Molecules.

In the conduct of research involving hazardous organisms, the investigator(s) adhered to the CDC-NIH Guide for Biosafety in Microbiological and Biomedical Laboratories.

David W Hobson 2/25/97
PI - Signature Date

TABLE OF CONTENTS

PAGE NUMBER

i	Front Cover
ii	Report Documentation Page (SF 298)
iii	Foreword
1	Table of Contents
2	Introduction
4	Description of the Work
6	Conclusions
7	Appendix A - List of Editors, Reviewers and Clerical Personnel
9	Appendix B - Distribution of Manuscripts Submitted for Review
11	Appendix C - Manuscript Review Form
14	Appendix D - Cover, Table of Contents, Title Page and Introduction from the Special Issue on "Chemical Defense Toxicology"

Introduction

The findings from U.S. Army-sponsored medical chemical defense research projects are of interest and benefit to other scientists engaged in similar or related work either with chemical agents or industrial chemicals, e.g., pesticides, raw materials, byproducts, pollutants, etc. Toxicology is a scientific discipline predominately interested in the results of such research. At present, there are no peer-reviewed scientific journals that strictly focus on presenting comprehensively, the procedures, data and results from medical chemical defense research. Researchers desiring to make such data available to the general scientific community must submit manuscripts to peer-reviewed journals that often do not have an editorial board experienced enough with such work to provide a proper scientific review. As a result, this work becomes fragmented and diluted in both time and content in the peer reviewed literature. This is at least one reason why it is difficult for interested scientists to stay informed with this area of research by reading only the current, peer reviewed, literature.

The Journal of the American College of Toxicology is a peer-reviewed journal routinely produces special peer-reviewed issues sponsored by industry and government organizations on topics of interest to a readership that is international in scope. Several members of the American College of Toxicology have significant first hand experience in conducting government-sponsored scientific research into medical chemical defense related problems. Therefore, production of a special issue of the Journal of the American College of Toxicology (JACT) was proposed for sponsorship by the U.S. Army Medical Research and Development Command to present, in one place, original articles presenting up-to-date findings on a variety of issues at the cutting edge of medical chemical defense research.

Topics identified as being of general interest to the readership included: findings from studies involving unique antidotal therapies, studies to investigate the mechanism(s) of action of chemical agents or their antidotes, presentation of methods used to develop or screen antidotes, and the presentation of new experimental designs that reduce animal usage requirements or that incorporate *in vitro* procedures in useful and cost effective ways in the evaluation of medical chemical defense problems.

The principal objective of this project was to:

"Develop and disseminate a peer-reviewed scientific document whereby procedures and data of current antidotal therapies for toxicants employed as chemical warfare agents might be shared openly with other interested scientists."

In order to accomplish this objective the following milestones were identified.

- Assemble a group of qualified editors and scientific reviewers capable of properly assessing the merit of each manuscript submitted to the Journal of the American Toxicology readership.
- Solicit and obtain manuscripts from researchers involved with cutting edge work in the medical chemical defense area.
- Review each manuscript submitted first for appropriateness of content and then for technical merit and make a decision with respect to the inclusion of each manuscript in the special journal edition.

- Obtain any necessary revisions to accepted manuscripts and produce the special issue as quickly as possible.
- Publish the peer-reviewed manuscripts in a special edition of the JACT Journal and distribute the edition to the readership.

Our goal was to produce the special issue in one year's time or less after receipt of the first manuscript.

Description of the Work

The project was initiated with partial funding beginning in September 1995. The remaining funds necessary to complete the project as proposed were provided in September 1996. The current Editor-in-Chief of the JACT, Dr. Robert Diener, being a veterinarian and widely experienced toxicologist as well as having excellent editorial and journal production credentials was designated as the Lead Editor for the special edition. The responsibility of the Lead Editor was to provide the initial format and content review on all articles submitted and to determine their suitability for further peer review and inclusion in the special issue. The Lead editor also served as a third peer reviewer for manuscripts that required a tie breaking accept or reject decision based on the results of the peer review. In order to assist Dr. Deiner in this process, it was necessary for the American College of Toxicology to select, from its membership, a qualified scientist with current experience in the field of medical chemical defense research.

Dr. David Hobson, a toxicologist/pharmacologist and long standing American College of Toxicology member who is well experienced with research involving a diversity of current medical chemical defense research issues was identified as the Co-Editor for the special edition and as the U.S. Army point-of-contact within the American College of Toxicology responsible for this project. The Co-Editor served as an expert consultant to Dr. Diener and coordinated the peer review process. The Co-Editor was also designated to prepare the final project report.

Ms. Carol Lemire, Executive Secretary of the American College of Toxicology served as the Administrative Coordinator for the project with Ms. Eve Kagan as her administrative assistant. The responsibility of the Executive Secretary was to serve as the principal point of contact with the U.S. Army Medical Research and Development Command for coordination of project financing and correspondence.

Qualified and interested reviewers for the manuscripts deemed suitable for inclusion in the special edition were solicited primarily from the ACT membership and included individuals with both *in vivo* and *in vitro* experience in conducting medical chemical defense research.

Appendix A provides a listing of all individuals and their roles in the completion of this project.

Next, the co-Editors provided guidance for submission of manuscripts for the special edition to the U.S. Army Medical Research and Development Command for dissemination to interested scientists currently working on government-funded medical chemical defense research projects. The principal point of contact for this activity was COL David Moore, U.S. Army Medical Research Institute for Chemical Defense.

The first manuscripts submitted for inclusion in this issue were received at the offices of Dr. Diener in April 1996. A total of 25 manuscripts were submitted over an approximate three month period.

The preliminary review for suitability of content was accomplished by Drs. Diener and Hobson and resulted in:

- Rejection of three manuscripts due to subject matter and content more suitable for other readerships (e.g., Analytical Chemistry) not well represented by that of the JACT readership,
- Identification of 15 manuscripts suitable for inclusion in the special edition and to receive full peer review.
- Seven manuscripts being identified as having subject matter general enough so as to be more suitable for inclusion in a regular edition of the JACT rather than the special edition on medical chemical defense.

Following the peer review, one additional manuscript was rejected, 11 manuscripts were returned with corrections in time to be included in the special edition, and three manuscripts were included in the list of those to be published in a regular edition of the JACT when they were returned with corrections.

Appendix B provides a disposition summary for the manuscripts received for review. Due to the sensitive and confidential nature of the scientific peer review process, the outcome of each individual peer review is not provided, but the overall disposition of the manuscripts is provided. Although the manuscripts differed in quality, the overall assessment was that of good to excellent quality for all manuscripts received relative to well established and published standards for the JACT.

All peer reviewers used a standardized manuscript review form upon which to base their decision to accept or reject a manuscript and upon which to provide anonymous comments and suggestions to the manuscript authors to improve content or quality of the document. Appendix C shows the Manuscript Review Form used by all peer reviewers.

The initial and peer review process began in April 1996 and required about five months to complete. Essentially all manuscripts selected for inclusion in the special issue required some form of revision, in most cases minor, following the initial and peer review. The turnaround time for obtaining completed revisions for these manuscripts was about two months.

Draft compilation of the special issue began in September 1996 and was completed in November 1996.

The publisher (Lippincott-Raven Publishers, Philadelphia, PA) received the completed draft version of the special issue in November 1996 and corresponded with the Lead Editor and Co-Editor on formatting issues in November through December 1996.

The special issue of the JACT was designated as Volume 15, Supplement 2, 1996, "Special Issue on Chemical Defense Toxicology." Pre-distribution copies of the issue were forwarded to the U.S. Army Medical Research and Development Command, via COL David Moore in January 1997. Copies of the special issue were mailed to and received by the ACT membership in February 1997.

Conclusions

The special issue met its objectives by providing a collection of peer reviewed, manuscripts covering a broad range of topics of interest and scientific value to the readership. The total time from the first manuscript submission and final publication was nine months. Relative to the time required to obtain peer review and publication of this number of manuscripts in a diversity of other scientific journals, review and publication occurred relatively rapidly and were not subject to the hazards of scrutiny and judgment of scientific merit by reviewers with little or no experience in this aspect of biomedical research.

The production of the special issue also demonstrated a potential and mechanism for future collaborations between U.S. Army sponsored research groups investigating medical chemical defense problems and the proper peer review and timely publication of their findings in an internationally recognized scientific journal. Such future collaborations could occur as special issues planned in advance to coincide with the completion or reporting of findings from several research groups such as annual bioscience reviews, interim reporting, etc.

Future collaborations would most likely be able to occur at reduced cost and time requirements to the government due to the identification of ways to increase manuscript submission and review process efficiency learned during completion of this project. Examples of these include the following:

- The manuscript submission date should be coordinated to coincide closely with a U.S. Army Medical Research and Development Command reporting requirement or invitation to present results at a U.S. Army organized meeting or research review.
- The special edition editors and peer reviewers should be selected prior to manuscript submission.
- All mechanisms (communication systems, manuscript review forms, formatted responses from the editors to the peer reviewers and authors, cost accounting practices, etc.) should be established and in place completely prior to receipt of the first manuscript.
- The editors should use a formal project plan to keep the special issue production well coordinated time wise and to be better able to identify cost and time reductions as they occur in real time rather than after the fact.

Overall, this project produced the expected document and demonstrated an effective and timely means of reporting comprehensively U.S. Army sponsored medical chemical defense research findings in a peer reviewed international journal.

Appendix A

List of Editors, Reviewers and Clerical Personnel

Personnel Principally Involved in Development, Review and Production of the Special Issue of the Journal of the American College of Toxicology, "Special Issue on Chemical Defense Toxicology."

Person	Role	Affiliation
Robert Diener, D.V.M.	Lead Editor, Final Reviewer	Consultant in Toxicology & Pharmacology, Whitehouse Station, NJ
David Hobson, Ph.D., D.A.B.T.	Co-Editor, Peer Reviewer	Director, Pharmaceutical Sciences, DPT Laboratories, San Antonio, TX
Carol Lemire	Project Liason for the American College of Toxicology	Executive Director, American College of Toxicology, Bethesda, MD
Eve Kagan	Administrative Assistant	Executive Assistant, American College of Toxicology, Bethesda, MD
Carl Olson, D.V.M., Ph.D., D.A.B.T., D.A.B.V.T.	Peer Reviewer	Research Leader, Battelle Memorial Institute, Columbus, OH
Donald Korte, Ph.D., D.A.B.T.	Peer Reviewer	Professor of Biology, Concordia University, Mequon, WI
James Blank, Ph.D., D.A.B.T.	Peer Reviewer	Principal Research Scientist, Battelle Memorial Institute, Columbus, OH
Nancy Monteiro-Riviere, Ph.D.	Peer Reviewer	Professor, North Carolina State University, Raleigh, NC
COL David Moore	Scientific Point of Contact, U.S. Army	Deputy Commander, U.S. Army Medical Research Institute for Chemical Defense
Robert Pancotti	Supervising Production Editor	Lippincott-Raven Publishers, New York, NY

Appendix B

Distribution of Manuscripts Submitted for Review

Manuscript Distribution Summary

Manuscripts Submitted	Manuscripts Rejected	Manuscripts Selected for Publication in Special JACT Issue	Manuscripts Selected for Publication in a Future Regular JACT Issue
25	4	11	10

Appendix C

Manuscript Review Form

JOURNAL OF THE AMERICAN COLLEGE OF TOXICOLOGY (JACT)
MANUSCRIPT REVIEW FORM

MANUSCRIPT NUMBER: _____

AUTHOR: _____

TITLE: _____

GENERAL ASSESSMENT (Please check appropriate box)

1. Is JACT the proper place for publication?

_____ Yes _____ No

2. Is manuscript:

_____ Acceptable in its present form.
_____ Acceptable, with minor revisions noted under Comments.
_____ Acceptable, if extensive revisions noted under Comments are made
_____ Unacceptable. Please include reasons under Comments.

3. If manuscript is acceptable, with or without revisions, estimate its overall quality.

_____ A. Excellent. Innovative - Publish as soon as possible.
_____ B. Good - No serious flaws.
_____ C. Fair - Marginal quality, publish only if space is available.

SPECIFIC ASSESSMENT (Answer questions appropriate to article)

YES NO

1. Is the title clear and precise? _____
2. Is the Abstract descriptive of contents? _____
3. Are enough details presented in the Materials and Methods Sections? _____
4. Are adequate statistical evaluations of data provided? _____
5. Are the Figures and Tables of suitable clarity and quality? _____
6. Are authors' conclusions justified by the data? _____
7. Is the Discussion section pertinent to the main theme of the paper? _____
8. Are adequate and correct references provided? _____
9. Could the paper be improved by shortening? _____
10. Are organization, style and grammar satisfactory? _____
11. Could the paper be presented as a Short Communication rather than as a regular article? _____
12. Are appropriate ethical standard for the experimental use of live animals followed? _____

Signature

Please detach and sign original only

JOURNAL OF THE AMERICAN COLLEGE OF TOXICOLOGY
MS _____

COMMENTS WHICH MAY BE TRANSMITTED TO AUTHOR

GENERAL

SPECIFIC

COMMENTS TO EDITOR (Not for transmission to author)

Signature

Please detach and sign original only

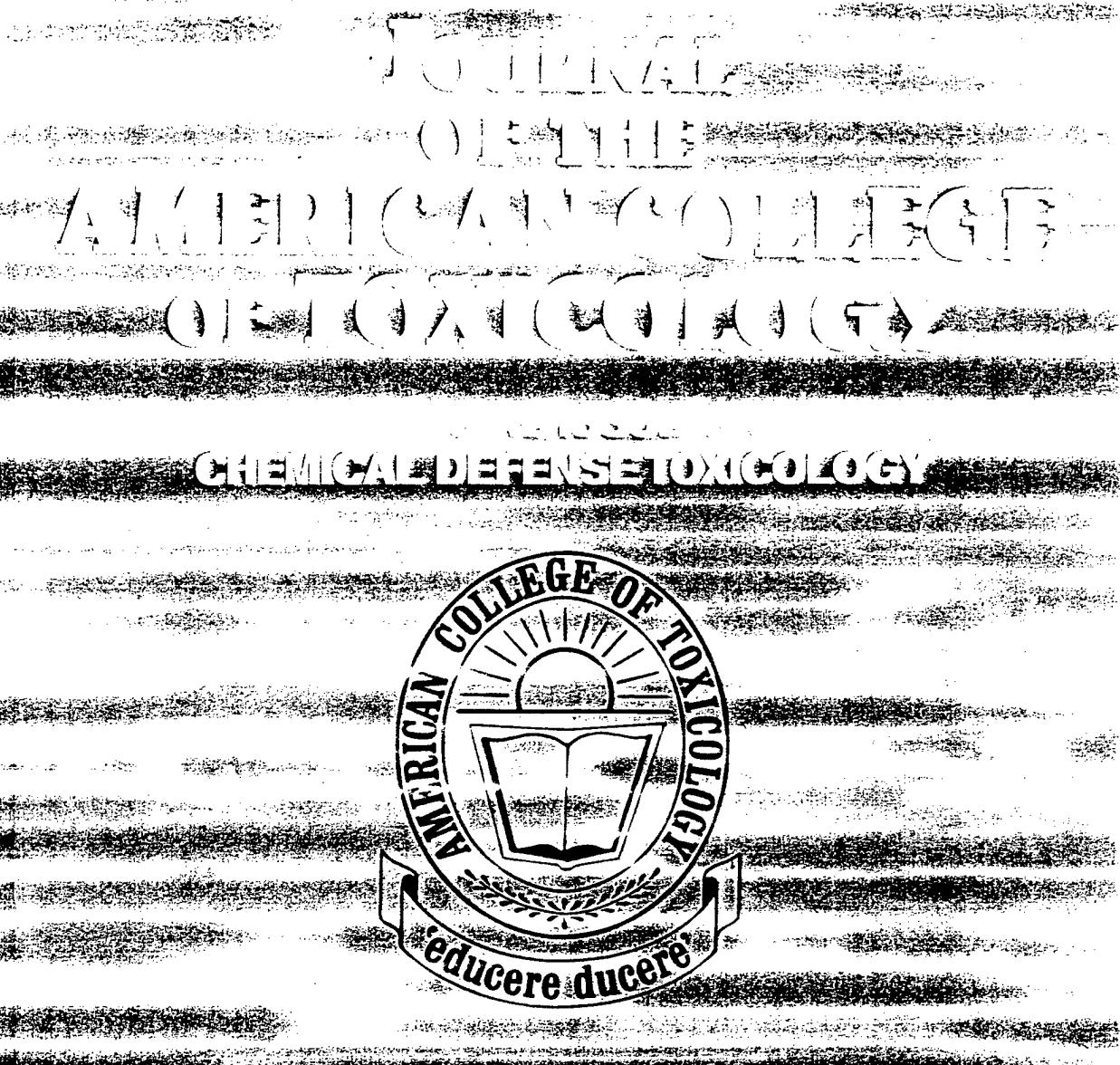
Appendix D

**Cover, Table of Contents, Title Page and
Introduction from the Special Issue on
“Chemical Defense Toxicology”**

Volume 15

Supplement 2

1996



Editor-in-Chief
Robert M. Diener

Lippincott - Raven

P U B L I S H E R S

Journal of the
American College of Toxicology

Volume 15, Supplement 2
1996

SPECIAL ISSUE ON
CHEMICAL DEFENSE TOXICOLOGY

David W. Hobson
Robert M. Diener
Co-Editors

CONTENTS

S1 Introduction

David W. Hobson

S2 Sulfur Mustard-Induced Decrease in Membrane Fluidity

Radharaman Ray, Richard H. Legere, and Clarence A. Broomfield

S9 Cytometric Analysis of DNA Damage in Cultured Human Epithelial Cells

After Exposure to Sulfur Mustard

Eileen S. Emison and William J. Smith

(continued on next page)

This journal is indexed in *Current Contents/Life Sciences*, *Science Citation Index*,
Chemical Abstracts, and *Excerpta Medica*.

Journal of the American College of Toxicology (ISSN 0730-0913) is published bimonthly in February, April, June, August, October, and December by Lippincott-Raven Publishers at 12107 Insurance Way, Hagerstown, MD 21740. Business offices are located at 227 E. Washington Square, Philadelphia, PA 19106-3780. Printed in the U.S.A. Periodicals postage paid at Hagerstown, Maryland, and at additional mailing offices. *Subscription rates for Vol. 15, 1996:* Personal subscriptions \$202 in U.S., \$217 elsewhere; institutional subscriptions \$240 in U.S., \$260 elsewhere. Please add \$4.00 per order for handling. Single copies \$45. Journal issues prior to the current volume, when available, may be ordered at the single copy rate. For subscribers outside North America, add \$5.00 for air freight. Address for subscription information, orders, or changes of address (except Japan): 12107 Insurance Way, Hagerstown, MD 21740, or call 1-800-638-3030; in Maryland call collect 301-714-2300. In Japan, contact Igaku-Shoin, Ltd., 1-28-36 Hongo, Bunkyo-ku, Tokyo 113, Japan. Payment should accompany all orders. Please enclose present mailing label with all change of address requests. Address advertising inquiries to Madelyn Lopez, Lippincott-Raven Publishers, 1185 Avenue of the Americas, New York, NY 10036; telephone (212) 930-2666; telefax (212) 575-1160.

Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 616354.

Postmaster: Please send change of address to *Journal of the American College of Toxicology*, P.O. Box 1550, Hagerstown, MD 21741.

Copyright © 1997 The American College of Toxicology. All rights reserved.

CONTENTS

S19 In Vitro Studies of Glucose Metabolism in Human Epidermal Keratinocytes Exposed to Sulfur Mustard
Margaret E. Martens

S32 Immunologic Cytokine Expression in Human Keratinocytes After Exposure to Sulfur Mustard
Ellen M. Kurt, Robert J. Schafer, Clarence A. Broomfield, David W. Kahler, and Carmen M. Arroyo

S36 Okadaic Acid and Calyculin A Reverse Sulfur Mustard-Induced G₂/M Cell-cycle Block in Human Keratinocytes
Bruce W. Hart and John J. Schlager

S43 Evaluation of Anticonvulsant Drugs for Soman-Induced Seizure Activity
Tsung-Ming Shih, John H. McDonough, Jr., and Irwin Koplovitz

S61 Effects of Soman on Isolated Human Bronchi
Margaret G. Filbert, James L. Ellis, G. Kenneth Adams III, and David H. Moore

S69 Development of a Rat Model for Subacute Exposure to the Toxic Organophosphate VX
D. E. Lenz, D. M. Maxwell, and L. W. Austin

S78 Characterization and Treatment of the Toxicity of O-isobutyl S-[2-(diethylamino)ethyl]methylphosphonothioate, a Structural Isomer of VX, in Guinea Pigs
Donald M. Maxwell, Karen M. Brecht, and Irwin Koplovitz

S89 Neuronal Toxicity of Cyanide in NG108-15 Neuroblastoma Cells
S. S. Deshpande, F. C. Kauffman, R. E. Sheridan, and M. Adler

S99 Tachykinins and Pulmonary Edema After Acute Phosgene Exposure in Guinea Pigs
R. M. Bauer, G. D. Young, and J. R. Keeler

*Manuscripts should be sent to: Robert M. Diener, DVM, 185 Aster Court, Whitehouse Station, NJ 08889
[Telephone: (908) 534-5582; telefax: (908) 534-5522.]*

Lippincott-Raven Publishers and The American College of Toxicology cannot be held responsible for errors or for any consequences arising from the use of the information contained in this journal. The appearance of advertising in this journal does not constitute an endorsement or approval by Lippincott-Raven Publishers or The American College of Toxicology for the quality or value of the product advertised or of the claims made for it by its manufacturer.

PERMISSION TO PHOTOCOPY ARTICLES: This publication is protected by copyright. Permission to photocopy must be secured in writing from: Permissions Dept., Lippincott-Raven Publishers, 227 East Washington Square, Philadelphia, PA 19106-3780; FAX: 215-238-4419; or Copyright Clearance Center (CCC), 222 Rosewood Dr., Danvers, MA 01923; FAX: 508-750-4470; or UMI, Box 49, 300 North Zeeb Road, Ann Arbor, MI 48106-1346; FAX: 313-761-1203.

**Journal of the
American College of Toxicology**

**Special Issue on
Chemical Defense Toxicology**

Co-Editors

David W. Hobson, Ph.D., D.A.B.T.
DPT Laboratories
San Antonio, TX 78215

Robert M. Diener, DVM
Whitehouse Station, NJ 08889

Volume 15, Supplement 2
1996

Lippincott-Raven Publishers

Introduction

The development and use of chemical agents as strategic weapons in the modern sense began in the early part of this century. Since then, toxicologists and scientists in many disciplines have engaged in research to understand the mechanisms by which chemicals such as sulfur mustard, phosgene, cyanides, and acetylcholinesterase inhibitors act and to develop effective treatments that will eliminate or reduce the threat that such agents pose to military personnel.

As we approach the end of this century, it is sobering to think that, in some parts of the world, the threat posed by the use of chemical agents as weapons to achieve a military objective or to invoke terror in civilian populations remains real. Furthermore, despite important progress made toward understanding the mechanisms of toxic injury for some of these agents, and despite the many significant developments achieved in finding and implementing effective treatments and prophylactic measures against these agents, much work remains to be done.

The purpose of this supplement to *Journal of the American College of Toxicology* is to share some of the more recent findings in the important area of chemical defense toxicology. We hope to stimulate scientific thought and dialogue toward understanding the toxicology of the existing chemical agents so that safe and effective countermeasures can be developed and the threats that these agents pose can be reduced.

The American College of Toxicology acknowledges the invaluable assistance of some of its members who are knowledgeable in this area of research and the U.S. Army Medical Research and Development Command in the production of this supplement. The Editors also thank Col. David Moore and other scientists at the U.S. Army Medical Research Institute for Chemical Defense for their technical assistance and advice during the preparation of this supplement.

We hope that you will find this supplement both informative and scientifically interesting.

David W. Hobson, Ph.D., D.A.B.T.
Co-Editor

**Personnel Receiving Pay (Direct or Indirect) from Cooperative
Agreement DAMD17-95-2-5032**

Person	Role	Affiliation
Robert Diener, D.V.M.	Lead Editor, Final Reviewer	Consultant in Toxicology & Pharmacology, Whitehouse Station, NJ
David Hobson, Ph.D., D.A.B.T.	Co-Editor, Peer Reviewer	Director, Pharmaceutical Sciences, DPT Laboratories, San Antonio, TX
Carol Lemire	Project Liason for the American College of Toxicology	Executive Director, American College of Toxicology, Bethesda, MD
Eve Kagan	Administrative Assistant	Executive Assistant, American College of Toxicology, Bethesda, MD
Carl Olson, D.V.M., Ph.D., D.A.B.T., D.A.B.V.T.	Peer Reviewer	Research Leader, Battelle Memorial Institute, Columbus, OH
Donald Korte, Ph.D., D.A.B.T.	Peer Reviewer	Professor of Biology, Concordia University, Mequon, WI
James Blank, Ph.D., D.A.B.T.	Peer Reviewer	Principal Research Scientist, Battelle Memorial Institute, Columbus, OH
Nancy Monteiro-Riviere, Ph.D.	Peer Reviewer	Professor, North Carolina State University, Raleigh, NC
Robert Pancotti	Supervising Production Editor	Lippincott-Raven Publishers, New York, NY